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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/976,931	10/11/2001	Clifford L. Hersh	PA1951US	2047
22830	7590	03/13/2006	EXAMINER	
CARR & FERRELL LLP 2200 GENG ROAD PALO ALTO, CA 94303			ALI, SYED J	
			ART UNIT	PAPER NUMBER
			2195	
DATE MAILED: 03/13/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/976,931	HERSH, CLIFFORD L.	
	Examiner	Art Unit	
	Syed J. Ali	2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 10, 13, 15 and 17-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 10, 13, 15 and 17-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 27, 2005 has been entered. Claims 1-7, 10, 13, 15, and 17-27 are presented for examination.

2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. **Claims 1-7, 10, 13, 15, and 17-27 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**

5. As per claims 1-7, 10, 13, 15, and 17-27, the claims are non-statutory as they fail to produce a "useful, concrete, and tangible result." *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F. 3d 1368, 1373-74 (Fed. Cir. 1998). The claims are directed to nothing more than an algorithm, failing to indicate how the invention accomplishes a practical

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application. That is, the claims fall under the judicial exception of an “abstract idea,” i.e. an algorithm, which is ineligible for patent protection. *Diamond v. Diehr*, 450 U.S. 175, 185 (1981).

6. While such an idea is ineligible subject matter in itself, a practical application of such an idea may be statutory subject matter. For instance, Applicant’s specification indicates that the reduction or deferral of rebalancing a data structure, including minimizing or eliminating locking the data structure, may be beneficial for improving performance during a database rebalance/update (pg. 3). However, the claims remain non-statutory because they are devoid of any such practical applications and merely recite an algorithm.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. **Claims 1-7, 10, 13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walker (“Self-Balancing Binary Search Tree”).**

9. As per claims 1-7, 10, 13, and 17 Walker teaches the invention as claimed, including methods and systems for reducing the number of times a tree data structure is rebalanced by deferring the rebalancing, comprising the steps of:

(a) allowing a sub-tree of the tree data structure to grow until a number of unbalanced levels reaches a threshold greater than one (pg. 4), wherein the threshold is $\log_2 n$ for a tree data structure having about n nodes and is a constant number of levels greater than a level of a balanced portion of the tree data structure (pg. 4, this is inherently the trigger for a rebalance, as the difference in subtrees will be greater than one when the node is inserted at a certain depth of the tree); and

(b) rebalancing the tree data structure, wherein rebalancing the tree data structure further comprises:

(i) developing first and second sets of rebalancing operation tasks, the first set of operation tasks operable to effect a first set of element state transitions and the second set of operation tasks operable to effect a second set of element state transitions, the first and second set of element state transition being distinct one from the other (pg. 4);

(ii) performing the first set of operation tasks in a first phase (pg. 4, the first set of operations places the root node of an unbalanced subtree into the subtree with the smaller number of nodes and then pulls up a node to restore balance); and

(iii) performing the second set of operation tasks in a second phase (pg. 4, the second set of operations may be triggered by pulling up a node, requiring shifting at lower levels to account for the moved data).

10. Although Walker does not explicitly teach rebalancing the tree once the threshold level is reached, Walker suggests that the decision as to when the rebalancing operation should be

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triggered is an implementation detail to be decided on a strategic basis (pg. 4, “A balancing strategy would simply be a strategy used to decide when to perform a shift”). The main teachings are how to go about performing the rebalancing, wherein the details of when to shift are “trivial” and open to any number of strategies. One strategy would rebalance when the difference in nodes in the left and right subtrees is two or more; another would rebalance when the difference of the maximum and minimum depth of subtrees is two or more.

Moreover, Applicant’s claimed strategy of rebalancing when the unbalanced depth reaches a threshold greater than one is markedly similar to the strategies in Walker of requiring a difference of two or more. Rebalance operations are known to be expensive, particularly when there are a large number of nodes. Thus, it would have been obvious to a person having ordinary skill in the art that the number of rebalance operations should be reduced as much as possible. This is exemplified by the disclosure in Wikipedia regarding balanced binary search trees (“Self-Balancing Binary Trees”), which indicates the importance of keeping the height of a tree within a factor of the lower bound of the tree, which is based on the number of nodes. Wikipedia is a resource that is written by the public, presumably those having ordinary skill in the art, and points out that precise balance is undesirable due to the cost of continual rebalancing.

11. Finally, the process of rebalancing using existing pointers in a first phase and external pointers in a second phase is a well-known technique, which any person having ordinary skill in the art would be able to implement within the “trivial” rebalance described by Walker. For instance, Nilsson (“Balanced Binary Tree Algorithm”) describes creating an ordered array from an unbalanced tree and then translating the ordered array into a balanced binary tree. A person having ordinary skill in the art would also recognize the overhead involved in such a rebalance

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procedure, particularly when the number of nodes is large, suggesting the desirability of minimizing the number of rebalances as much as possible.

Allowable Subject Matter

12. **Claims 15 and 18-27 would be allowable if rewritten or amended to overcome the rejections under 35 U.S.C. 101 set forth above in numbered paragraphs 3-6.**

13. As allowable subject matter has been indicated, Applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J. Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T. An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Syed Ali
March 3, 2006



MENG-AL L AN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100